Understanding the Importance of AASHTO’s National Transportation Product Evaluation (NTPEP) Audit Program- HDPE Thermoplastic pipe and reinforcing steel (rebar)/WWR

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- Background
- Program Components
- Growth and Participation
- Benefits
- Expansions of AASHTO’s NTPEP Audit Program
Background

What is AASHTO?
- Nonprofit, nonpartisan association representing highway and transportation departments in the 50 United States, the District of Columbia, and Puerto Rico
- Primary Goal - foster the development, operation, and maintenance of an integrated national transportation system

What is NTPEP?
- Established within AASHTO in 1994, as a technical service program, who reports to the Standing Committee on Highways (SCOH)
- Combines the professional and physical resources of the AASHTO member departments in order to evaluate materials, products and devices of common interest for use in highway and bridge construction
- Primary Goal - provide cost-effective evaluations for the state Departments of Transportation (DOT)
- NTPEP Audit Program (NAP)
  - Several AASHTO Member Departments found it necessary to implement a national quality control/quality assurance program
  - Work plan was created through NTPEP
  - Program and administrative documents were developed and implemented
  - Letters for Participation were sent to Manufacturers
  - Began in 2008
    - 41 Participants (37 Compliant) - HDPE Pipe
    - 2 Participants (2 Compliant) - Rebar
Program Components

Desktop Review (conducted once every 5 years)

- Testing Personnel
- AASHTO/ASTM Standard Specifications
- Size and Type of Material Produced by Plant
- AASHTO Pipe Identification Markings
- Product Information
  - How many facilities does the manufacturer own?
  - How is resin received at the plant?
  - Does each lot of resin have a Certificate of Analysis?
  - Billet Information (Rebar Only)
  - Bar Information (Rebar Only)
  - Identification Markings
- Matrix of quality Control tests, facilities, and intervals at which tests are completed
● Training and competency evaluation information for quality control testing conducted in-house
● Sample test reports (MTR’s for rebar)
● Review of Quality Management System
  ▪ Quality Control of Raw Materials
  ▪ Quality Control Inspection and Testing
  ▪ Resolution of Non-Conforming Product or Test Results
  ▪ Retention of Test Results and Product Traceability
  ▪ Laboratory Equipment Maintenance and Calibration Procedures
  ▪ Procedures for Marking, Storage, Shipping, and Handling of Finished Product
  ▪ Procedures for Conducting Internal Audits and Management Reviews
On-Site Audit (conducted once every 12 months)

- During each audit, the NTPEP Manufacturing Auditor focuses on the following sections of each facility:
  I. Desktop Review Findings
  II. Review of Documentation
  III. Sample/Yard Inspection and Production Line Walkthrough
  IV. Product Traceability
  V. Split Sample Testing
  VI. Quality Control Testing
I. Desktop Review Findings

- Evaluated during on-site audit
- Results are included in final Report
II. Review of Documentation

- AASHTO and ASTM standard specifications
- Training and competency evaluation records for all employees involved in quality control testing
- Quality manual
- Equipment calibration/standardization/check records
III. Sample/Yard Inspection and Production Line Walkthrough

- Inspection of manufacturing environment and Melt Shop (Chemical Analysis-rebar)
- Resin and pipe samples are collected for split-sample testing purposes (As of 2011, rebar samples will be collected during the auditing of steel mills)
- Products inspected during yard walkthrough:
  - Pipe
  - Fittings
  - Couplings
  - Rebar
- Various sizes of pipe (three sizes of M294 pipe and three sizes of M252 pipe, which have been manufactured within the past year) are selected:
  - Resin Samples
  - Resin Lot Test Results
  - The test report associated with each lot representing the pipe selected
A total of 30 bars (or wires), 3 from 10 separate heats (or lots) spanning the sizes the mill produces will be sampled and tested at the Mill’s laboratory facility:

- Bill of Lading
- Mill Test Reports
- Third Party Testing Completed By IL DOT
IV. Product Traceability

- The paperwork for the six samples of pipe retrieved from the yard walkthrough are reviewed (raw material and pipe test reports):
  - Testing completed at the required AASHTO interval
  - Detailed results
  - Certificate of Analysis
  - 2\textsuperscript{nd} and 3\textsuperscript{rd} party test results
V. Split Sample Testing

- NTPEP requires each pipe manufacturer (not each facility) to subject each diameter of single-wall or dual-wall M252 and M294 pipe that it would like to qualify, to split sample testing.
- Pipe of a given size and type must be tested to qualify initially and retested every five years to maintain qualification.
- Split sample testing is completed by a 3rd party laboratory contracted through AASHTO’s NTPEP Audit Program.
- 30 bars (or wires), 3 from 10 separate heats (or lots) spanning the sizes the mill produces - A615, A706, A996
- Internal testing of 10 bars is completed during the on-site audit
- Split sample testing is completed by a 3rd IL DOT
VI. Quality Control Testing

- Procedure and testing equipment during each on-site audit for the following quality control tests:
  
  - Resin Density (AASHTO M252/AASHTO M294/ASTM D1505)
  - Resin Melt Index (AASHTO M252/AASHTO M294/ASTM D1238)
  - Notched, Constant Ligament-Stress (NCLS) (AASHTO M294/ASTM F2136)
  - Carbon Black Content (AASHTO M252/AASHTO M294/ASTM D4218)
  - Wall Thickness (AASHTO M294/ASTM D2122)
  - Inside Diameter (AASHTO M252/AASHTO M294/ASTM D2122)
  - Length of Pipe (AASHTO M252/AASHTO M294/ASTM D2122)
  - Unit Weight (AASHTO M252/AASHTO M294/ASTM D2122)
  - Perforation Locations & Dimensions (AASHTO M252/AASHTO M294)
  - Water Inlet Area (AASHTO M252/AASHTO M294)
  - Brittleness (AASHTO M252/AASHTO M294/ASTM D2444)
  - Pipe Stiffness/Flattening (AASHTO M252/AASHTO M294/ASTM D2412)
  - Joint Integrity (AASHTO M252/AASHTO M294)
  - Environmental Stress Cracking (ESCR) (AASHTO M252/AASHTO M294/ASTM D1693)
Procedure and testing equipment during each on-site audit for the following quality control tests:

- Deformation Measurements (A615/A706/A996)
  - Spacing
  - Height
  - Gap
- Unit Weight (A615/A706/A996)
- Bend Test (A615/A706/A996)
- Tension Test (A615/A706/A996)
Conclusion of On-Site Audit

- “Close-Out” Meeting:
  - Summary of Findings
  - Corrective Action Reports
  - Accessing final, full Audit Report
Accessing NTPEP Audit Results

- Results are uploaded onto AASHTO’s NAP website: [http://data.ntpep.org](http://data.ntpep.org)
  - Participant Status (compliant/non-compliant)
  - Desktop Review Documentation, including most current Quality Manual
  - Audit Report
  - Split Sample Results
  - Corrective Action Report(s)
  - Size/diameter of pipe(s) each facility has qualified in the NAP Program
  - Certificate of Compliance
PROGRAM GROWTH AND PARTICIPATION
HDPE Thermoplastic Pipe

Participation vs. Calendar Year

Number of Participants

Calendar Year

2008 2009 2010
PROGRAM GROWTH AND PARTICIPATION REBAR

Participation vs. Calendar Year

Number of Participants

Calendar Year

2008 2009 2010

0 5 10 15 20 25 30

0 5 10 15 20 25 30
Participation of AASHTO Transportation Departments- HDPE Thermoplastic Pipe
Participation of AASHTO Transportation Departments - REBAR

Not Participating
NTPEP Audit Program Benefits

- Improve their quality assurance program
- Use the program as a marketing tool
- Educate their personnel
- Proves to the states which manufacturers have a satisfactory quality control/quality assurance program
- Allows for manufacturers to have a uniform testing
- Combination of the quality control/quality assurance requirements with the split sample testing allows for all of the HDPE thermoplastic pipe manufacturers to be held to the same standards
- Timely and cost efficient
Expansions of AASHTO’s NTPEP Audit Program

- Weldable Wire Reinforcement (2011)
- PVC Pipe (2012)
- Products being brought forth by industry/AASHTO member departments:
  - Erosion control products
  - Geo-textiles
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